

## ORIGINAL ARTICLES

## VALUE OF PYELOGRAPHY FOR THE DIAGNOSIS OF HYDRONEPHROSIS.\*

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The newer urological methods (cystoscopy, ureteral catheterization, the microscopic and functional examination of renal secretions, radiography, etc.), in connection with the clinical observation (history, subjective and objective symptoms, palpation, etc.) enable us, in the great majority of cases of unilateral renal lesions, to arrive at a definite diagnosis prior to a contemplated operation. In fact with sufficient experience in the application and interpretation of the various diagnostic methods it is, at present, only rarely necessary to resort to exploratory exposure of a diseased kidney as the last and only means of recognizing the character of its pathological lesion.

Instances of great and not rarely unsurmountable difficulties are, though, still comparatively frequent in the diagnosis of intermittent hydronephrosis, which, especially in the absence of a palpable tumor, often remains guesswork until revealed on the operating table by the autopsy in vivo. For this class of cases pyelography with a shadow-casting fluid frequently represents the only means which is apt to shed light upon the true character of the lesion. This is vividly demonstrated by the following observation:

Case 1. Past history: An Italian gardener of 41 (who was referred by Dr. M. Isnardi) had suffered during the last eight years from intermittent attacks of left-sided renal colic connected with frequent and painful micturition. At three different occasions hematuria had occurred during these attacks. All general and urinary symptoms were absent during intervals of attacks which of late had increased in frequency and intensity (severe colic, vomiting, marked prostration).

Present illness: Physical examination, palpation of kidneys, bloodcount. Wassermann test and X-Ray plates for calculi-shadows negative. Temperature and pulse-rate normal. Urine clear, showing a trace of albumen and microscopically a number of pus-cells and granular and hyaline casts; no tubercle-bacilli. Cystoscopy reveals in an otherwise normal bladder a slight congestion at the trigone. Ureteral catheterization had to be repeated several times since no urine could be obtained from the left renal catheter at the two first cystoscopic sittings, and finally gave the following results:

Right Kidney.	Left Kidney.
Transparency: Clear.	Transparency: Clear.
Reaction: Acid.	Reaction: Acid.
Albumen: None.	Albumen: Trace.
Urea: 1.7%.	Urea: 1.1%.
Sugar reaction after phloridzin: Begins in 10 min. Complete in 18 min.	Sugar reaction after phloridzin: Begins in 28 min. Complete in 38 min.
Quantity of sugar: 1.5%.	Quantity of sugar: 0.95%.
Indigocarmine: In 6 min. deep blue.	Indigocarmine: In 16 min. less deeply blue than on right side.
Microscop.: Fresh blood cells.	Microscop.: Granular and epithelial casts; degenerated small round epithelial cells.

Culture of left renal secretion sterile; guinea-pig test negative as regards tuberculosis. Filling of renal pelvis with fluid fails to elicit characteristic symptoms of colic.

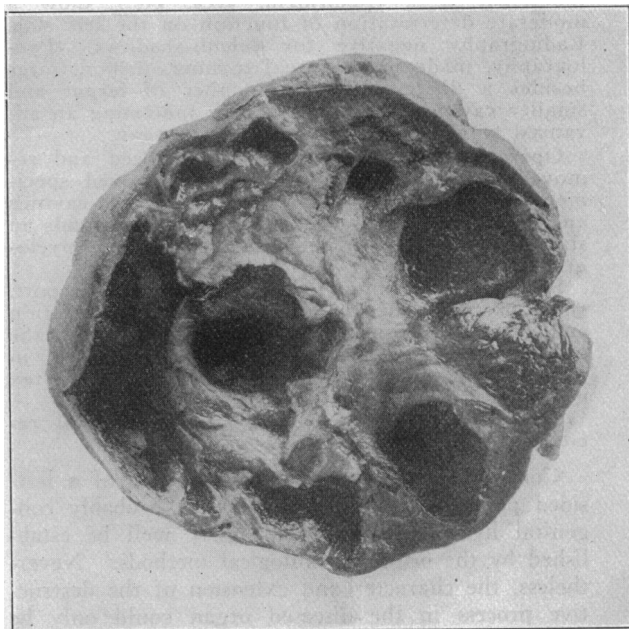
Pyelography is now done by means of injecting about 30 cc. of a 25% cagentos solution through

a large-calibred ureteral catheter into the left renal pelvis. Shadows of a greatly enlarged pelvis, dilated renal calices and one particularly large shadow (cavity) at the lower kidney-pole are visible on plate (Fig. 1).



For several days after the cagentos injection the patient voided dark-colored urine, which upon chemical examination, showed presence of silver and, microscopically, color pigments and a few leukocytes. Five days after the intrapelvic cagentos injection another radiographic exposure of the left kidney was done and a perfect cast of all renal cavities, into which the silver solution had permeated, is obtained on the plate.

Operation: As soon as all untoward symptoms, incidental to pyelography had abated, the left kidney is exposed by the usual lumbar incision and freed with difficulty from dense adhesions. One of these adhesions contains a large vessel crossing the ureter near the renal pelvis. Removal of kidney, which upon incision, presents a dilated pelvis and several cavities exactly corresponding in size and shape with the shadows of the pyelographic plate (Fig. 2).



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The patient makes a rapid and uneventful recovery.

**Comment:** As the most plausible interpretation of the subjective and objective symptoms presented in this case, prior to pyelography, a tentative diagnosis of left-sided nephritis was made.

Since the publications of Pousson, Rovsing and others, upon similar observations we know that intermittent attacks of colic and haematuria are frequent and characteristic symptoms in the course of an unilateral nephritis. The microscopic findings (many casts, comparatively few pus-cells) served to corroborate that diagnosis. On account of the comparatively slight deterioration of renal function on the diseased side a radical operative measure (nephrectomy) seemed to be contra-indicated, in fact, in the absence of more direct diagnostic evidence, a definite conclusion as regards the treatment (expectant or operative) could not be reached. At this juncture pyelography at once cleared up the situation the correct diagnosis could be read from the plate; the only rational treatment (nephrectomy) was now obvious.

**Case 2.** A carpenter (referred by Dr. Mansfeldt) had suffered from occasional attacks of left-sided lumbar colic during the last ten years; these attacks gradually increased in frequency and intensity and, of late, were followed by frequent and painful micturition.

**Present illness:** Pulse and temperature normal. General examination negative. Kidneys not palpable. Urine cloudy, containing abundant pus microscopically; bacteriological examination shows coli in almost pure culture, no tubercle-bacilli. Cystoscopy reveals the picture of a marked chronic cystitis; the trigone is so intensely injected that the recognition and catheterization of the ureteral orifices proves to be a difficult task, which is only feasible after several futile attempts. Finally both ureters are catheterized to the pelvis. The right-sided renal secretion is clear and does not contain microscopical abnormal constituents, while the urine of the left side is cloudy and shows, microscopically, pus in abundance. Phenoloulphonephthaleine appearance is delayed and the various functional tests (phloridzin, urea, etc.) show a moderate deterioration of function on the left side. Radiography negative for calculi-shadows. Pyelography, made in the usual manner, demonstrates besides a dilated pelvis a number of larger and smaller cavities of the left kidney indicating an advanced stage of destruction of that organ.

**Operation:** The left kidney is exposed and removed in the usual manner. The removed specimen shows upon section a number of cavities and a dilated pelvis, which exactly corresponds in size and shape with the shadows on the pyelogram.

Sections, according to the pathological report, show in region of dilated pelvis much granulation and cicatricial tissue. The superficial layers of the granulation tissue are extensively necrotic in places. No tubercles found. In parts the cortex is much shrunken and fibrous.

The patient makes a rapid and uneventful recovery.

**Comment:** In this case the diagnosis of a left-sided pyonephrosis as a sequel to a probably congenital hydronephrosis could fairly well be established by the ordinary urological methods. Nevertheless, the character and extension of the destructive process in the diseased organ could only be ascertained through the study of the pyelographic

plate and, obviously, led to the logical and correct operative procedure. Thus the undue prolongation of the operation and the loss of blood invariably connected with nephrotomy were avoided, while the quickly performed nephrectomy resulted in a rapid and uncomplicated recovery.

If, though, in these cases, pyelographic evidence led to the performance of radical operations, it, on the other hand, was instrumental in preventing operative interference in the third observation.

**Case 3.** Past history: A farmer of 26, who was referred by Dr. E. Schmoll, had, about twelve years ago, fallen backwards from his wagon without immediate or remote untoward symptoms, except an occasional backache. Since the last eight months he suffered from intermittent attacks of left-sided renal colic connected with frequent and painful micturition. These attacks gradually increased in intensity and frequency.

**Present illness:** Physical examination including palpation of kidneys negative. X-Ray plates, made at two separate sittings, and, in both instances, by trained radiographers, negative for calculi shadows. Urine contains pus and blood, microscopically, no tubercle-bacilli. Cystoscopy shows marked trigonitis (cystitis coli) which renders the detection and catheterization of ureteral orifices a difficult procedure. At the first sitting only the left ureter is entered, the catheter reaching the renal pelvis without impediment; microscopical examination of the left-sided renal secretion shows pus and blood. At succeeding sittings only the right ureter can be catheterized, while the secretion of the left kidney has to be obtained through a bladder-catheter for comparative functional tests and microscopical examination. These demonstrate a marked deterioration of function on left side and normal functional and microscopical findings on right side.

A tentative diagnosis of a left-sided hydro-nephrosis is made and the patient returns to his farm for a few weeks to arrange important business prior to operation. Upon his return to the hospital the patient eliminates, in micturating, a small rough-edged calculus (urate) of the size and shape of a bean.

Examination of renal secretions, after bilateral ureteral catheterization, still points to a functional and anatomical deterioration of the left kidney. Pyelography though, which now is feasible, demonstrates a normal renal pelvis and calices except a slight dilatation of the lowest one. Upon these findings the patient is advised to return home without operative interference for the present.

**Comment:** The failure of skiagraphy to demonstrate, in this case, the small urate concrement on the plate, corroborates the guarded opinion of experienced radiographers as regards the absolute diagnostic reliability of negative stone-plates. If pyelography would have been feasible, prior to elimination of the calculus, it might have materially aided in the correct interpretation of the case, by demonstrating changes in the caliber of the ureter (dilatation above calculus) which Braasch<sup>1</sup> in his extensive pyelographic work on ureter-concrements has observed in more than two-thirds of his cases. But even after expulsion of the calculus, no answer was found to the patient's question, whether all untoward symptoms would from now on cease, so that he could return to his distant home and his arduous occupation without submitting to the operation, for the performance of which he had re-entered the hospital. As in the first

case the correct answer could be read from the pyelogram.

My work with pyelography was not satisfactory until I began to use shadow-casting solutions of comparatively high concentration. Really good and, for diagnostic purposes, useful plates were obtained, since I, following the suggestions of Uhle and his associates<sup>2</sup> began to experiment with cargentos (colloidal silver oxide).

All that should be expected from a pyelographic plate can be accomplished with a 25% cargentos solution. Lower concentrations do not give shadows of sufficient density. I do not share Uhle's<sup>3</sup> opinion regarding the harmlessness of the silver-salt up to concentrations of 50% although the statement is ventured that no serious or permanent irritation or injury of kidney-tissue will follow a skilfully performed pyelographic injection. I prefer to inject, with the patient in a moderate Trendelenburg position, in order to permit the shadow-casting fluid to gravitate into all renal cavities, and after a little while, to remove the patient to the X-ray room, where radiography is done, while the injection is continued under gentle pressure. The quantity of the injected fluid is variable. In the first case reported in this communication, at least an ounce must have reached the renal pelvis without causing any appreciable untoward symptoms. As a rule, though, a smaller amount of 8 to 15 cc. will suffice.

#### CONCLUSIONS:

1. The diagnosis of hydronephrosis is materially aided and, in some instances, only feasible by pyelography.
2. It offers a valuable guide to the method of treatment or operative procedure to be followed in a given case.
3. This method should be applied only on the basis of strict indications and by a skilled operator.

1. J. Am. Med. Ass'n, Dec., 1911.
2. Ann. of Surgery., April, 1910.
3. l. c.

### EXOPHTHALMIC GOITER: INDICATIONS AND CONTRAINDICATIONS TO OPERATION.\*

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The following statements are based upon the observation of about 300 cases of exophthalmic goiters examined the past two years while clinical and surgical assistant to the Mayo Clinic at Rochester, Minn.

Exophthalmic goiter, Grave's disease, Basedow's disease, or hyperthyroidism is now generally regarded to be due to an over secretion of the thyroid gland.

Pathological examination of thyroid tissue removed from cases with clinical symptoms of hyperthyroidism always shows a hyperplasia, i. e., too many secreting cells.

Methods used to diminish the amount of secretion as by reducing the blood supply of the gland and by removing the excess of cells have given

such prompt relief that there remains but little room for doubt that the symptoms are not produced by an overworked gland.

Feeding of thyroid extract in excess to a healthy individual if sufficiently prolonged may produce all the symptoms of exophthalmic goiter.

The etiology of this over secretion is not so clear; infection, shock, heredity and a disturbance in the metabolism of the thyroid gland are the principal factors which are being considered. The fact that acute tonsillitis is exceptionally frequent just before and during an attack is strengthening the infectious theory.

Well developed cases of hyperthyroidism can be diagnosed at a glance but other cases require repeated examinations. A change in temperament and a pulse of 90 to 100 beats per minute may be the only symptoms present in the early stage.

The symptoms in the order of their usual onset and frequency are mental irritability, rapid heart action, vasomotor disturbances, tremor, muscular weakness, loss in weight, exophthalmus, diarrhea and vomiting.

The onset of symptoms may be sudden, gradual, or irregular.

An attack may abort, terminate fatally in a few weeks, or progressively become worse with slight intermissions to end in death in a few years—from secondary complications. H. S. Plummer has demonstrated that exophthalmic goiter runs a fairly typical course, reaching the maximal height of intoxication during the latter half of the first year and then rapidly subsiding to the twelfth month. The symptoms may entirely disappear in the next six months or what is more frequent continue as exacerbations for two to four years. Other attacks with distinct intermissions are also common.

A disease of such a protean character, to be treated intelligently, requires a careful study and a judgment based upon a great number of cases.

Operation has been proven to be the method of choice in treating exophthalmic goiter as it produces the quickest, safest and most permanent results. Seventy-five per cent of operated cases are rapidly cured; the other 25 per cent include patients who still complain of a few symptoms of hyperthyroidism and therefore require further operation, and cases whose symptoms are those of secondary changes in the heart, liver and kidneys.

The surgical mortality is one-half to five per cent, depending entirely upon the experience of the operator.

The medical mortality is 10 to 25 per cent. within five years.

Graves disease may occur in early childhood or in late adult life. In 200 cases the average age of onset of symptoms was the 32nd year. It is about three times as frequent in the female as in the male.

A mild grade and transient hyperthyroidism may occur during puberty, probably as a result of a generally increased functional activity. These cases as a rule do not require surgical interference and soon subside with or without medical treatment.

Every case of hyperthyroidism of mild or mod-

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